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A FIELD EXPERIENCE--A WHY, A HOW.

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THE CARTERET COUNTY MARINE SCIENCE PROJECT OFFERS THE SCIENCE TEACHER THE MEANS OF PROVIDING A DIRECTED DISCOVERY, FIELD-ORIENTED APPROACH TO THE STUDY OF OCEANOLOGY. SPECIALISTS PROVIDE AUDIO-VISUAL MATERIALS, AND DO THE PLANNING, ORGANIZATION, AND DIRECTION OF PRACTIAL FIELD EXPERIENCES. FOLLOWING THE FIELD EXPERIENCE, A MARINE SCIENCE PROJECT REPRESENTATIVE WILL USUALLY RETURN TO THE CLASSROOM TO REVIEW HIGHLIGHTS OF THE TRIP, DISCUSS ANSWERS TO FIELD PROBLEMS PREVIOUSLY PRESENTED, AND ESTABLISH AREAS WHICH MIGHT PROFITABLY BE INVESTIGATED ON FUTURE FIELD EXERCISES. THE MARINE SCIENCE PROJECT ALSO PROVIDES THE INDIVIDUAL TEACHER WITH A SOURCE OF A WIDE RANGE OF OCEANOLOGICAL MATERIALS, IN ADDITION TO A COMPLETE LIBRARY AND PERIODICAL FILE. (DA)

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THE FIELD EXPERIENCE

WHY

HOW

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A WHY

A pity that the process of education can't be so simple as some would imagine: A mere casting of the fruits of wisdom to the intellectually famished. More and more, those who call themselves educators are coming to realize that they are, and should be, offering seeds and a means to cultivate, rather than resultant fruits.

If one accepts these statements, he must be immediately aware of the terrible burden explicit with them. There are those who stifle the students with an array of "absolutes"; those who subscribe to the system of paternizing the student with a trite pallative of innocuous pablum designed to quies and satisfy rather than challenge. Their guiding rationale seems to be never do anything that hasn't been done before. Like balls in an ill-played billiard game, they guide smoothly from cushion to cushion, seldom disturbing, seldom unnerving, seldom accomplishing.

Fortunately, man is not wholly catholic in his sheepishness. Always there are a few who will dissent. For it may be said of man that he is inquiring; a creature subject to change.

Changes in the educational methods have been strongly felt in the specific area of science education. Prior to the advent of the 20th century some form of natuee study was considered a necessary part of a gentleman's education. Generally, this took the form of a series of pragmatic lectures based upon

the local faunal and faunal components. Coupled with it were the collection and preservation of representative species. Little attempt was made to integrate material. Instead, the rote memorization of data together with the "appreciation of nature" was deemed adequate.

With time came technology. So it was that during the fifty years surrounding the turn of the century the biological sciences were treated as technical absolutes in the high school life was for the biologist, chemistry for the chemist and the only thing of concern was which organism was present when the milk spoiled. The nature study of earlier times was relegated to the academic dung heap. Any material seen by the students was prepared and presented to them. Little thought was given to relating biology to other sciences. In fact, biology was considered a simple subject to be taken in grade ten--relegating chemistry and physics to the more advanced, sophistocated students of grades eleven and twelve.

As the 1950's approached, dissatisfaction among biological academicians grew. Biology was still being treated as a nonvital, pickled-in-a-bottle sort of endeavor. Preparation in the public schools was grossly inadequate for students who would shortly be faced with the burgeoning molecule. It's a long step from death in a bottle to life in the round.

The Biological Sciences Curriculum Study attempted to correct this situation. In the late 1950's and early 1960's

they produced a series of three text books with integrated laboratory exercises. These texts each approached the subject from a different point of view: ecological, molecular, and cellular. Laboratory material tended to be highly structured, glassware-oriented and largely suborganismic. The result is a situation in which the student deals with systems rather than organism--with pieces rather than the whole. Long and loud are the justifications for the B.S.C.S. material. There are, however, no hard scientific data (as of June, 1967) which indicate that the vaunted superiority of the program is extant. On the contrary, there is some evidence that other, less structured approaches are as good or better.

Contemporary with this major curriculum change was a resurgence of the idea of discovery learning. Jerome Bruner, (6) a well known proponent of the discovery mode, cites four major benefits from this approach:

(1) increase in intellectual potency

(2) the shift from extrinsic to intrinsic rewards

(3) insight development through heuristics.

(4) the aid to conserving memory

He feels that a structured curriculum causes the belief that nothing can be found "in the environment by way of regularity or relationship". Advanced statistical methods have allowed the researcher in this area to quantify his data, at least in part, and to present his findings in an intellectually more honest manner (1, 3, 5, 7, 8, 11, 12, 13, 18, 19).

Several cogent points have been revealed from several associated types of research. A child tends to grasp principles and thoroughly when allowed to discover them (7, 12, 18). Not only does he attain them more thouraghly but, he retains the principles over a greater period of time (11, 18). Moreover, the discovery or guided discovery mode is particularly effective on the slow learner (18). Haslerud and Myers (8) have found evidence that independently derived principles are more transferable than those which are given.

In addition to this quantified evidence, each cited paper either alludes to the heightened interest of the pupil or directly states it (1, 2, 4, 5, 7, 8, 9, 10, 12, 13, 14, 15, 17, 18, 20, 21, 22, 23, 24). Charen (7) surveyed his experimental group and found that they not only preferred open-ended (discovery) experiments but even requested more time in which to engage in these sorts of activities. He found a majority of the involved teachers to be favorable to this approach. Mager (15) feels that auto-sequencing of material tends to explain the affect. The results of his learner-generated sequences leads him to two conclusions:

1...."the content sequence most meaningful to the learner is different from the sequence guessed by the instructor to be meaningful to the learner;

2....the learner motivation increases as a function of the amount of control he is allowed to exercise over the learning experience.

The modern biology laboratory presents a dearth of these sorts of activities (2). Sequencing is tightly structured and the students' physical activities limited (16). A regularly attended field epperience would alleviate this deficiency. It cannot be denied that a Hawthorn effect would accompany such a unique departure. To call it undesirable, however, would be unthinking. Dr. Ernest Burkman (per. comm.) has said that of some way could be devised to teach the sciences with an attention-getting, live animal orientation, that the task of the instructor would be infinitely easier.

In summation, the following points may be emphasized.

1. The discovery method allows for a more thorough and more lasting attainment of principles.
2. Motivation of pupils is heightened in the discovery situation.
3. The discovery method reaches students with more widely diverse abilities.
4. The field experience is a discovery-prone situation.

It is concluded, therefore, that the field experience would be a valuable addition to the armory of instructional skills available to the teachers of the sciences.

A HOW

The Carteret County Marine Science Project is offering such a discovery-prone, field-oriented situation. We feel that instruction in the natural processes can best be accomplished where the processes can be shown first hand. It is for these compelling reasons that the central theme of the Marine Science Project is the field trip. But how is this applicable to you as teachers and administrators? Assume for the moment that you foresee teaching a marine-oriented unit in your tenth grade general biology class. You further decide that the ecology of the salt marsh is the specific area that you wish to study. What help and assistance could you expect from the Marine Science Project?

We are geared to serve the teacher in three ways:

1. As a source of audio-visual materials on oceanology.
2. As a source of resource materials on oceanology.
3. To prepare for, direct, and follow up the field trip.

Each of you has on hand the catalogue of audio-visual material available from the project. In addition, you have been made aware of our oceanological library and periodical file. This leaves the preparation, direction and follow up of the field trip.

PREPARATION

Without the vital steps of preparation, little can be expected from the field trip. A good rule of thumb is to att mpt to establish a time and date at least two weeks in advance. Many reasons for this are obvious to you. However, some may be more obscure. For instance:

1. If the ecology trip will require a low tide, will it occur on the right day?
2. Long range weather forecasts might indicate high winds and low temperatures. Would it be better to move the trip ahead a week?
3. Vehicular difficulties might cause alteration of location or time. With sufficient notice, necessary changes can be made smoothly.
4. Each student will be required to return a parent-signed permission form for the trip. Two or three weeks is not too long to allow for the forms to be returned.

Following this initial planning step, the teacher should begin to work closely with the field specialist. Of utmost importance is the question: What do you (the teacher) wish the student to DO on the trip; what objectives do you wish to satisfy? The answer to the question might take into account these ideas.

1. The objectives should correlate with the unit being taught.

2. Look-and-see-trips are of questionable value. The usual result from such a trip is chaos.
3. The discovery mode is demonstrably the best. However, a practical method is guided discovery.
4. An often-used and very successful approach is that of establishing a problem. For instance, direct the students to determine the relationship of plant root structure and the type of substratum. Or you might choose to investigate the distribution of mollusca in the salt marsh. An any event, the problem should be clearly deliniated.

To orient the class to the situation, the field specialist may make plans to visit the class for a lecture. This presentation will consist of two portions.

1. A series of 35 mm transparencies to illustrate the habitat that will be visited.
2. An array of preserved material representative of the area.

During this discussion, the M.S.P. representative will advise the class of field procedures and conduct. Equipment will be discussed and any special procedures will be covered.

In short, an attempt will be made to preview, for the student, the conditions and problems that they will encounter during the field trip.

Execution

A bus will meet your students at the school on the day of the trip and transport them to the field trip site. You will be met there by the field specialist and the mobile laboratory. (It is imperative that a count be made of the children on the bus and this count compared with the student permission forms. The count must be repeated before the bus leaves the field trip site. This is a more simple proceedure than trying to explain to John Q. Parent why John Jr. was left on Town Marsh. It has been our experience that if each student is paired with another for the trip's duration, the teacher's problem of coping with the students is lessened.)

The specialist will briefly survey the area with the entire class. The material covered will be approximatley a condensation of the preparatory lecture. If the problem which they are to investigate warrants, the class will be broken into smaller groups. The Marine Science Project field specialist will circulate among the groups. He will point out, but not lead; advise but not direct.

A short time (perhaps 15 min.) before the trip is to end, the class will reassemble. This gives an opportunity for expositional dialectical intercourse to explore questions and problems are second time is of even greater value. This the function of the third aspect of the field trip, the post mortum. It is here that we say again; review again, those things that have been discussed three times before. The

Marine Science Project representative will return to your classroom within a few days following the trip. Three things will be done:

1. Highlights of the trip will be reviewed.
2. The answers that the students have determined for the problem will be discussed.
3. Other problems and other questions the students might choose to investigate will be established.

So what have we accomplished? A great deal of class time and effort have been expended. Has it been worth while? Let's list some of the tasks that the students can do now that they couldn't do before their field trip to the salt marsh:

1. Map and label a typical salt marsh.
2. Name five plants and ten animals common to a salt marsh.
3. Identify salt marsh zonation and define physical and chemical parameters
4. Identify and discuss the importance of the salt marsh.
5. Identify and discuss the probable zonation and parameters thereof, other than in the salt marsh.
6. Identify and discuss three ecological relationships present in the salt marsh.
7. Look--see--question!

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